NEW ACRIDIDAE FROM WESTERN NORTH AMERICA

(Orthoptera)

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A number of new species of Orthoptera have been represented among the several thousands specimens sent to me for identification during the last three years. Large collections have come from Drs. Paul Hurd and Jerry Powell of the University of California at Berkeley, and from Mr. A. T. McClay at Davis. Smaller but exceedingly interesting shipments have come from Messrs. George Buxton of the California Department of Agriculture at Sacramento and Jacques Helfer of Mendocino. Dr. W. F. Barr of the University of Idaho has sent many finely prepared specimens from his state.

Deposition of holotypes and allotypes is designated in the description of each species. In accordance with the wishes of the collectors and curators of this material, paratypes will be distributed to the major collections of Orthoptera in this country.

I have profited from the illuminating study by Ashley Gurney (1960) of several groups of *Melanoplus*, and his comments in correspondence have been a continuous help.

Trimerotropis pogonata Strohecker, new species

(Figs. 1, 2, 3)

Form short, stout. Antennae slightly longer than head and pronotum together, apically blunt, proximal and distal portions composed of quadrate articles, articles of median region about two-thirds as broad as long. Pronotum with low median carina, cut by two sulci. Metazone one and two-thirds times as long as prozone. Front margin advanced as distinct angle upon occiput, hind margin with straight sides meeting at angle of 90 degrees or slightly more. Lateral carinae distinct on metazone, disappearing at principal sulcus but briefly indicated near front margin. Lateral lobes sloping, entirely visible from above, lower posterior angle broadly rounded and somewhat flaring. Head short and not deep, genae inflated, eyes globose but smaller than is usual in the genus. Fastigium smooth, moderately excavate, roundly declivent in profile, its lateral ridges almost straight and continued without interruption as the ridges of the frontal costa, which is sulcate throughout. Lateral foveolae represented by small, triangular, flattened areas. Ocelli large and very convex. Tegmina and wings fully developed but extending but little beyond body. Hind tibiae in lateral view slightly bowed, the feeble curvature enhanced by distal flattening of tibia. Tibial spines, 11-12 on inner margin, 8-9 on outer, are longer than is usual in *Trimerotropis* and the distal calcars are very long, the inner pair extending to or beyond apex of metatarsus, with lower one slightly longer. Legs and body, except abdomen,

are clothed with long white pubescence especially conspicuous on genae and lower portions of pleura.

Coloration: head, pronotum and tegmina mottled ferruginous-gray, abdomen and hind femora yellowish, hind tibiae pale yellow with spines and calcars black-tipped. The base of the tibia is ringed with black, broadly on the inner side, narrowly externally. The hind femur has a number of black points on its carinae; its inner face and lower sulcus are pale yellow with two broad black bands. The tegmen has two wide black areas confined to the costal field, and a number of rounded or quadrate spots in the dorsal and apical fields. Wings hyaline with a faint yellowish tinge, without trace of dark band but with venation of costal and apical regions dark.

The ovipositor valves of the female are slender, smooth and entirely pale, the dorsal valves strongly retracted.

Measurements (mm): length of body, male 14.2, female 19; of pronotum, male 3.3, female 4.0; of tegmen, male 12.7, female 16.0; of hind femur, male 9.3, female 12.5.

Holotype male: GROVER CITY, SAN LUIS OBISPO COUNTY, CALIFORNIA, July 4, 1956, E. G. Linsley (California Academy of Sciences). Allotype Female: Oso Flaco Lake, San Luis Obispo County, California, July 13, 1959, A. E. Menke (California Academy of Sciences). Paratypes: two males with data of holotype, twelve males and three females collected at Oso Flaco Lake, July 13, 1959 by A. E. Menke, R. M. Bohart, W. A. Steffan, R. W. Spore, F. D. Parker, P. M. Marsh. A single female was collected by P. D. Hurd at San Marcos Ranch, Santa Ynez Mountains, Santa Barbara County on July 5, 1956.

The first specimens of this insect which came to me, I considered to be small individuals of *Trimerotropis helferi* but subsequent study shows them to be distinct. The stout form, long tibial spines and calcars, and ovipositor structure suggest generic differentiation but approximation to the length of the tibial calcars can be seen in *T. arenacea* and *T. helferi*, while the female ovipositor is similar to that of *T. albescens* McNeill. The melange of species now included in *Trimerotropis* must undoubtedly be partitioned but the introduction of another generic name now may contribute to the difficulties of the revisor of this confusing assemblage.

NEW SPECIES OF MELANOPLUS

Since Gurney's recent paper (1960) went to press, several new species of *Melanoplus* have been discovered by Jacques Helfer and by the personnel of the California Department of Agriculture. From Idaho, Barr has sent representatives of three new species.

In describing the aedeagi I have followed the terminology suggested by Eades (1961).

THE IMMUNIS GROUP

Melanoplus hupah Strohecker and Helfer, new species

(Figs. 7, 8, 35)

Male.—Size medium for the group, about equal to that of *immunis*, which it resembles. Head large; eyes large, their depth one and three-fourths length of genal groove; fastigium narrowed behind and distinctly sulcate; occiput, in front view, scarcely higher than upper margin of eyes; cheeks somewhat inflated. Pronotum feebly flaring in front, its anterior margin broadly and shallowly excavate at middle, its posterior margin convex and very obtusely angulate, its median carina low on prozone, sharp on metazone. In lateral view, prozone is almost level, not tumid as in *immunis;* lateral lobe is one and a half times as long (dorsally) as deep, tegminal sinus obsolete. Tegmina longer than pronotum and narrowly rounded at apex in holotype, but equal to pronotum and obtusely subangulate in a paratype, overlapping. Epiproct a little longer than its basal width, its topography similar to that of *immunis*. Arms of furcula short and narrow, widely separated, about as long as their segment. Cercus, in lateral view, essentially straight but appearing upturned because of concavity of dorsal margin; in dorsal view apical half of cercus is broadly incurved; its external face is sulcate distally. Aedeagus is somewhat like that of *M. rehni* Hebard (Gurney 1960:151, fig. 8) but its dorsal valves are in form of semi-cylinders which conceal the sclerites; these are irregular rods in the internal wall of the valves. Ventral valves are similar to those of *rehni*, thin, transparent, narrow plates, rounded at apex.

Coloration: non-distinctive. Front and cheeks olive, occiput brown with postocular dark bar on each side. Pronotum brown, metazone paler. Lateral lobes shining black in prozonal portion, anterior and lower margins and metazonal portion pale. Mesepisternum olivaceous, mesepimeron black, metepisternum largely yellow. Abdomen mostly black with dorsal carina and row of sensillae on each side pale, sternites and lower portion of tergites yellow. Femora and front and middle tibiae yellow-brown, none of femora with dark markings. Hind tibiae pale green.

Measurements (mm): length of body 19-21; of pronotum 3.9-4.6; of tegmen 4.0-5.0; of hind femur 10.0-11.1.

Female.—much like the female of *immunis*. Consistent characters for differentiating females of this group of *Melanoplus* have not been discovered. In some females of *hupah* the head, pronotum, pleura and hind femora are pale green, the tegmina and abdomen brown. In these specimens there is a very narrow postocular band of black, and several small areas of dark color on the sides of the prozone form an irregular line. The transverse sulci of the pronotum are brown and the sides of the abdomen show vaguely delimited dark areas.

Measurements (mm): length of body 23-27; of pronotum 4.6-5.5; of tegmen 5.2-6.7; of hind femur 12.5-14.2.

Holotype male and allotype female: KNEELAND, HUMBOLDT COUNTY, CALIFORNIA, July 11, 1960, J. R. Helfer (U.S. National Museum No. 65994). Paratypes: 20 males and 13 females collected with the holotype and allotype.

The series was collected near the Kneeland postoffice, on damp, subirrigated land covered with lush grass and white clover. The grasshoppers were definitely associated with the clover. The only other acridid observed in this situation was *Chorthippus,* which was associated with the grasses.

Melanoplus wintunus Strohecker and Helfer, new species

(Figs. 9, 10, 34)

Very much like the preceding species and evidently closely related. The following differences are noted but they could hardly be used in taxonomic discrimination: fastigium less sulcate in *wintunus,* prozona flatter and with median carine indistinct, hind margin of pronotum broadly obtuse-angulate, arms of furcula shorter and more broadly triangular, much as in *immunis,* cercus smaller, thinner, its dorsal margin more strongly concave, its external face shallowly sulcate. The abdomen is largely yellow, with a large, quadrate, black area on the sides of each segment. The differences in the aedeagus are best set forth by illustration (Figs. 9, 10).

Measurements (mm): length of body of male 16-19, of female 21-23; length of pronotum of male 3.6-4.1, of female 4.7-5.3; length of tegmen of male 3.4-4.6, of female 4.3-5.4; length of hind femur of male 8.4-9.5, of female 10.9-11.6.

Holotype male and allotype female: PLASKETT MEADOWS, GLENN COUNTY, CALIFORNIA, July 26, 1961, J. R. Helfer (California Department of Agriculture. Paratypes: 16 males and 9 females collected with the holotype, and one male taken by F. L.

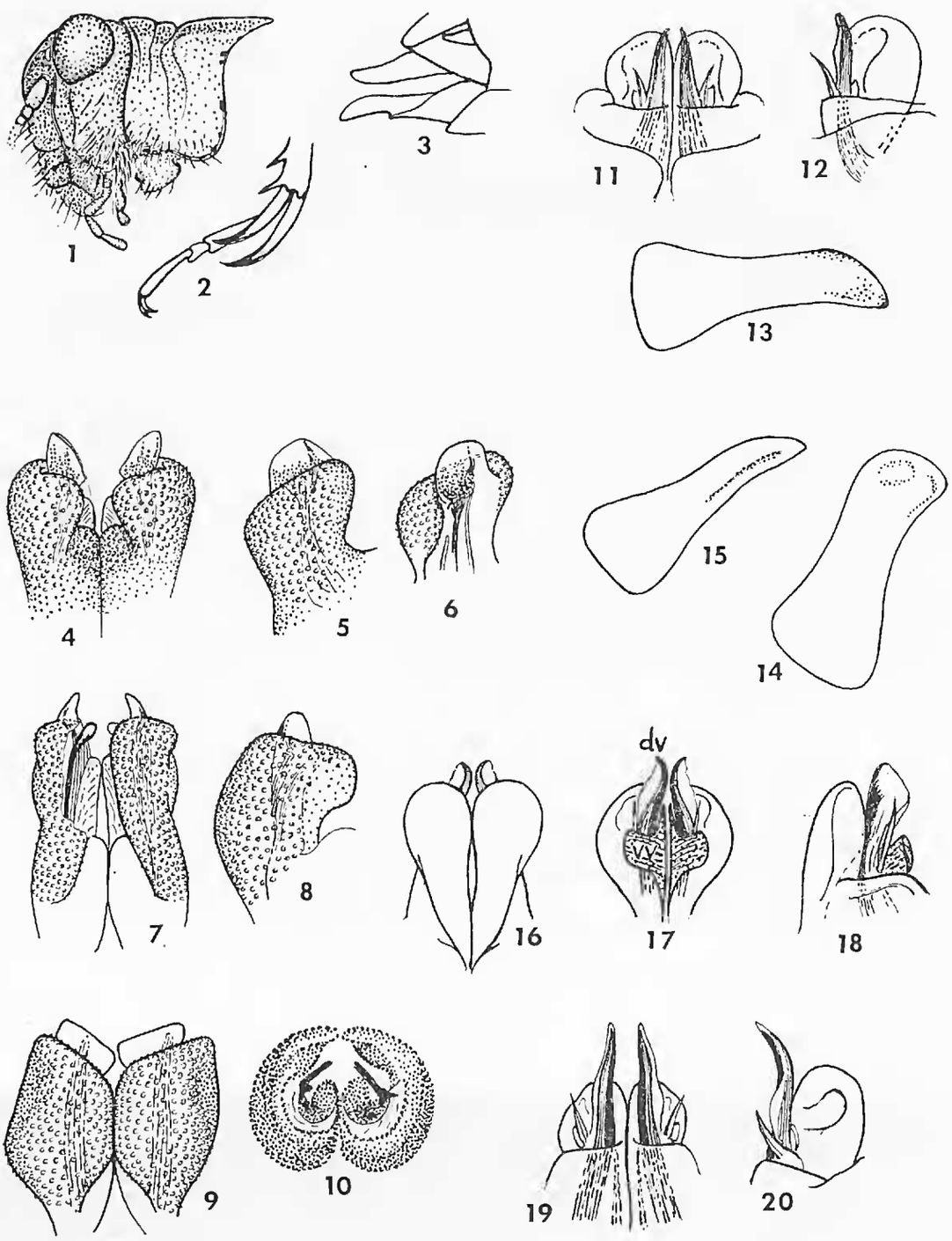
EXPLANATION OF FIGURES

Figs. 1-20. 1, *Trimerotropis pogonata* Strohecker, head and pronotum of male. 2, the same, metatibial calcars of male. 3, the same, ovipositor. 4, *Melanoplus eremitus* Strohecker, aedeagus, ventral (caudal) view. 5, the same, aedeagus, dextral view. 6, the same, aedeagus, median view of left dorsal valve. 7, *Melanoplus hupah* Strohecker, aedeagus, ventral (caudal) view, left side dissected. 8, the same, aedeagus, dextral view. 9, *Melanoplus wintunus* Strohecker, aedeagus, ventral (caudal) view. 10, the same, aedeagus, apical (dorsal) view. 11, *Melanoplus elater* Strohecker, aedeagus, ventral (caudal) view. 12, the same, aedeagus, dextral view. 13, the same, left cercus of male. 14, *Melanoplus siskiyou,* Strohecker, left cercus of male. 15, *Melanoplus buxtoni* Strohecker, left cercus of male. 16, the same, aedeagus, ventral (caudal) view, *in situ.* 17, the same, aedeagus, dorsal (anterior) view, *in situ.* 18, the same, aedeagus, dextral view. 19, *Melanoplus elaphrus* Strohecker, aedeagus, ventral (caudal) view. 20, the same, aedeagus, dextral view.

Blanc at Plaskett Meadows on August 22, 1952.

This species first came to the attention of the senior author through a single specimen sent by George Buxton in 1959. The junior author visited Plaskett Meadows to collect the series noted above. Because of the imperfect condition of the first-known specimen the holo- and allotype have been selected from this series.

The Plaskett Meadows locality is a fairly large spring area, subirrigated, and with tiny streams here and there draining into two small artificial lakes. The vegetation is lush: wiregrass, corn



lily, buttercup, rain orchids and other wild flowers, with many trees. On the first visit, in late June, the *Melanoplus* were immature, another trip in July yielded the series reported. No definite association with particular plants was observed, but the insects seemed to be absent from drier areas. A series of *M. borealis palaceus* Fulton was also taken here, a record which extends the known range of this grasshopper some hundred miles southward.

Melanoplus eremitus Strohecker, new species

(Figs. 4-6, 28)

Male.—Pronotum with median carina very low on the prozone, almost disappearing between sulci, evident but low on metazone. Tegmina equal in length to pronotum, apex rectangularly rounded to slightly acute. Furcula hardly evident, its arms broad and very short. Cercus two and a half times as long as basal width (somewhat foreshortened in figure), feebly upturned with apical third rather abruptly incurved. Aedeagus with dorsal valves semi-cylindric, concealing the slender sclerite, which ends above in a concave plate supporting an arcuate membrance. The ventral valves are typical of the *immunis* group.

Coloration: dorsum, including abdomen, blackish with some small buff markings behind eyes and along lateral carinae of pronotum. Face and genae olive. Antennae red-orange. Femora pale, hind femur with ill-defined dusky patches on outer face, lower pagina and inner face orange-red. Hind tibiae blue.

Measurements (mm): length of pronotum 3.6-3.9; of tegmen 2.9-3.8; of hind femur 8.3-8.8.

Female.—fastigium broad, plane, very little narrowed between eyes. Pronotum with median carina feeble but complete, front margin shallowly excavate at middle, hind margin obtusely subangulate. Tegmina widely separated, apices evenly rounded to subangulate.

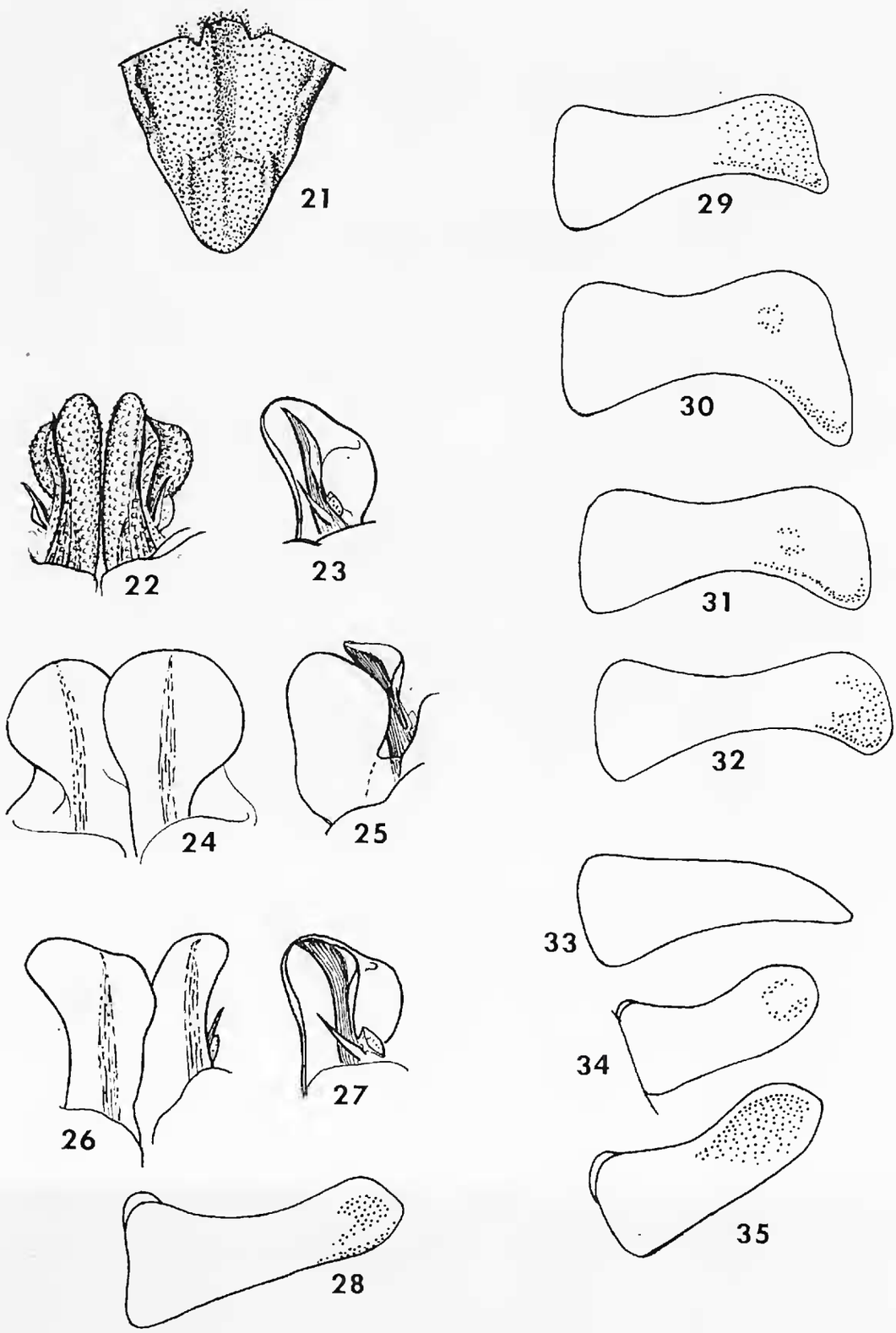
Explanation of Figures

Figs. 21-35. 21, *Melanoplus buxtoni* Strohecker, epiproct of male. 22, *Melanoplus validus* Scudder, paratype, Glendale, Oregon, aedeagus, ventral (caudal) view. 23, the same, aedeagus, dextral view. 24, *Melanoplus ascensus* Scudder, McCloud, Siskiyou County, aedeagus, ventral (caudal) view. 25, the same, aedeagus, dextral view. 26, *Melanoplus calapooyae* Hebard, Divide, Oregon, aedeagus, ventral (caudal) view. 27, the same, aedeagus, dextral view. 28, *Melanoplus eremitus* Strohecker, left cercus of male. 29, *Melanoplus ascensus* Scudder, McCloud, California, left cercus of male. 30, *Melanoplus calapooyae* Hebard, Divide, Oregon, left cercus of male. 31, *Melanoplus validus* Scudder, Glendale, Oregon, left cercus of male. 32, *Melanoplus ascensus* Scudder, Upper Klamath Marsh, Oregon, left cercus of male. 33, *Melanoplus elaphrus* Strohecker, left cercus of male. 34, *Melanoplus wintunus* Strohecker, left cercus of male. 35, *Melanoplus hupah*, Strohecker, left cercus of male.

Coloration: much as in male, but some specimens have areas on pronotum, mesopleura and femora green.

Measurements (mm): length of pronotum 4.7-5.0; of tegmen 3.8-4.6; of hind femur 10.6-11.4.

Holotype male and allotype female: TOP LAKE, EL DORADO COUNTY, CALIFORNIA, August 22, 1962, G. M. Buxton (California



Department of Agriculture). Paratypes: 11 males and 11 females with the same data as the holotype and two males taken by Peter C. Ting at Top Lake, August 27, 1950. All specimens associated with *Carex*.

THE SALTATOR GROUP

Hebard reviewed this group in 1937 but omitted *M. bernardinae* even though in the original dscription he had referred it to the *saltator* complex. Also omitted was *M. lepidus* Scudder, which was placed with *saltator* by Gurney in 1960.

In his treatment Hebard reduced *M. validus* and *M. calapoyae* to racial status under *ascensus*. This, I think, is a too summary dismissal of the taxonomic questions. The position of the dorsal valve of the aedeagus in relation to its sclerite, discussed by Hebard, may not be always fixed, i.e. the soft valve, subject to influence of the semi-rigid sclerite and to internal pressures, may asume different positions or may be displaced in the extraction of the phallus.

Specimens collected by George Buxton and others of the California Department of Agriculture during the past two or three years show that several additional species of this group occur in northern California. While these are closely related, the present evidence does not, I think, indicate intergradation.

While most of the species of the *saltator* group have the epiproct with a pair of oblique ridges on the apical half this feature is not present in all. Gurney has, however, pointed out a distinctive feature in the ventral aedeagal valves, which pass between and are then reflexed around the sclerites of the dorsal valves. The following simple key may be of use in preliminary sorting.

KEY TO MALE MELANOPLUS OF THE SALTATOR GROUP

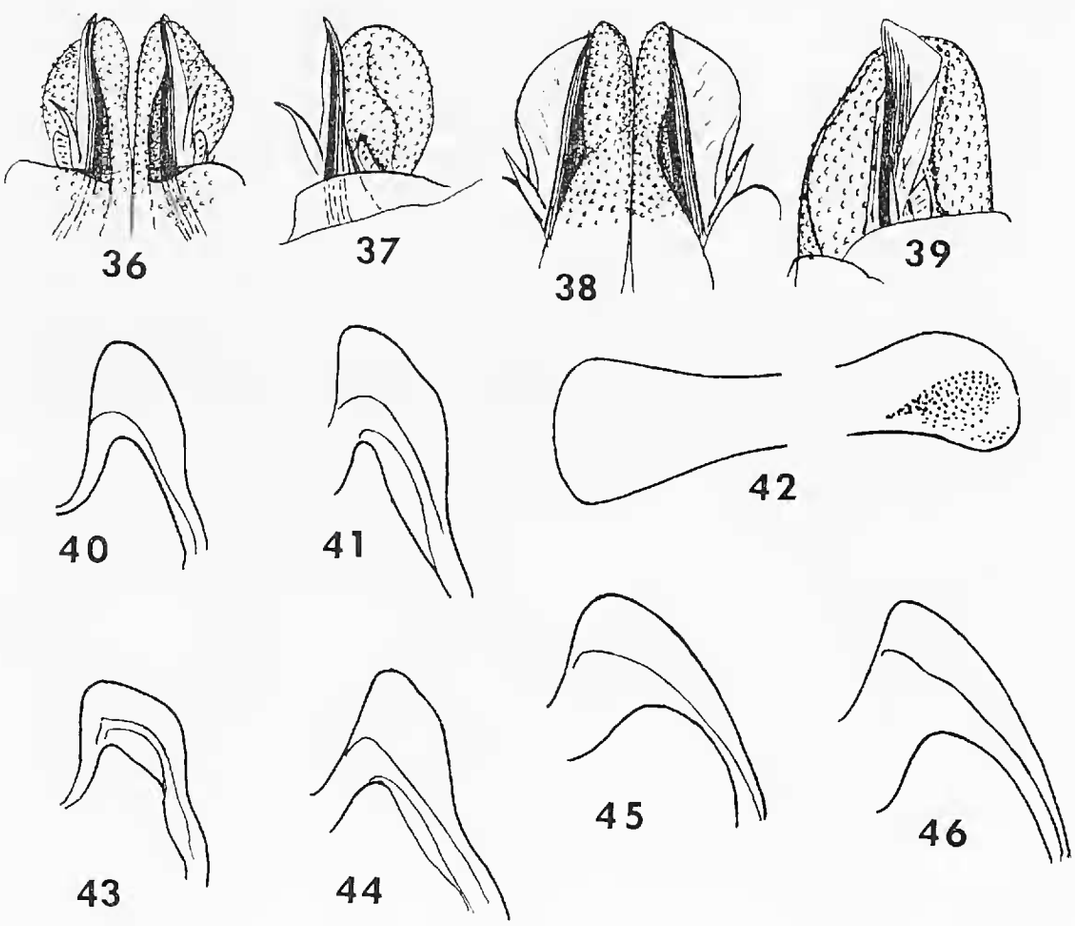
1. Cercus not or very little broadened at apex ..... 2.
   Cercus distinctly broadened at apex ..... 5.
2. Cercus much less than twice as long as broad (at base) ..... *bernardinae*.
   Length of cercus at least twice its basal width ..... 3.
3. Cercus obliquely truncate at apex ..... *elater*..
   Cercus continuously tapering, styliform ..... 4.
4. Distal ridges of epiproct parallel ..... *buxtoni*.
   Distal ridges of epiproct oblique ..... *elaphrus*.
5. Distal ridges of epiproct low, short, subparallel ..... *lepidus*.
   Distal ridges of epiproct oblique, complete ..... 6.
6. Tegmina somewhat attenuate, apex narrowly rounded ..... 7.
   Tegmina broadly to rectangularly rounded at apex ..... 8.

7. Lower distal angle of cercus greatly produced.....*calapooyae*.
   Lower distal angle of cercus slightly produced.....*siskiyou*.
8. Distal ridges of epiproct high and strongly arcuate.....*saltator*.
   Distal ridges low and gently arcuate.....9.
9. Epiphallic lophus broad, its dorso-later edge evenly arcuate.....*ascensus*.
   Lophus rather narrow, its edge undulately curved.....*validus*.

MELANOPLUS BERNARDINAE Hebard

Melanoplus bernardinae Hebard, Trans. Am. Ent. Soc., 46:388(1920). Type male, Vivian Creek, San Bernardino Mts., Riverside County, California.

Gurney (1960) has published figures of the epiphallus, cercus, aedeagus and epiproct of this species. I have seen but four males,



EXPLANATION OF FIGURES

Figs. 36-46. 36, *Melanoplus siskiyou* Strohecker, aedeagus, ventral (caudal) view. 37, the same, aedeagus, dextral view. 38, *Melanoplus saltator* Scudder, aedeagus, ventral (caudal) view. 39, the same, aedeagus, dextral view. 40, *Melanoplus siskiyou* Strohecker, right lophus of epiphallus. 41, *Melanoplus saltator* Scudder, right lophus of epiphallus. 42, the same, left cercus of male. 43, *Melanoplus elater* Strohecker, right lophus of epiphallus. 44, *Melanoplus validus* Scudder, right lophus of epiphallus. 45, *Melanoplus ascensus* Scudder, right lophus of epiphallus. 46, *Melanoplus calapooyae* Hebard, right lophus of epiphallus.

two from Tahquitz Valley in the San Jacinto Mts. and two from Tetley Park, San Bernardino Mts. collected by Timberlake at 4500 ft. The latter pair of specimens have the epiproctal ridges much as in *ascensus* i.e. oblique and complete.

Melanoplus elater Strohecker, new species

(Figs. 11-13)

Male.—fastigium broad and moderately sulcate, lateral ridges subparallel. Depth of eye but little less than twice length of genal groove. Pronotum with anterior margin evenly, roundly convex, median carina low but traceable throughout, a little higher on metazone, prozone: metazone ratio 25:19, hind margin broadly subangulate. Tegmina separated, apices rounded but with dorsal margin oblique, extending but little upon second tergite. Epiproct about as broad at base as long, lateral margins feebly tumid from base to about mid-length, whence a pair of curved, oblique ridges course to apex. The topography of the plate is similar to but much weaker than that of *ascensus*. Furcula more prominent than in *ascensus*, lobes broadly triangular, apically rounded and about as long as tenth tergite. Cercus slightly surpassing apex of epiproct, twice as long as basal width, rapidly and symmetrically narrowed in basal third, thence subparallel to feebly widened and obliquely truncate apex.

Coloration: dorsum, including first three abdominal tergites, dusky. Head with postocular black band, continued on prozonal part of lateral lobe. Hind femora clay yellow with two dusky nubeculae, which are continued across the dorsal surface to inner face. Hind tibiae blue.

Measurements (mm): length of pronotum 3.7-4.1; of tegmen 3.5-4.0; of hind femur 9.1-9.8.

Female.—differs from female of *ascensus* in broader fastigium, which is not constricted between eyes, even front margin of the pronotum, and narrower, separated and apically subangulate tegmina. The ventral valves of the ovipositor are narrower and sharper than in *ascensus*.

Measurements (mm): length of pronotum 3.8-4.9; of tegmen 3.2-4.3; of hind femur 9.2-11.6.

Holotype male and allotype female: 5 MILES NORTHEAST OF ZENIA, TRINITY COUNTY, CALIFORNIA, September 19, 1962, from range, G. M. Buxton and F. L. Blanc (California Department of

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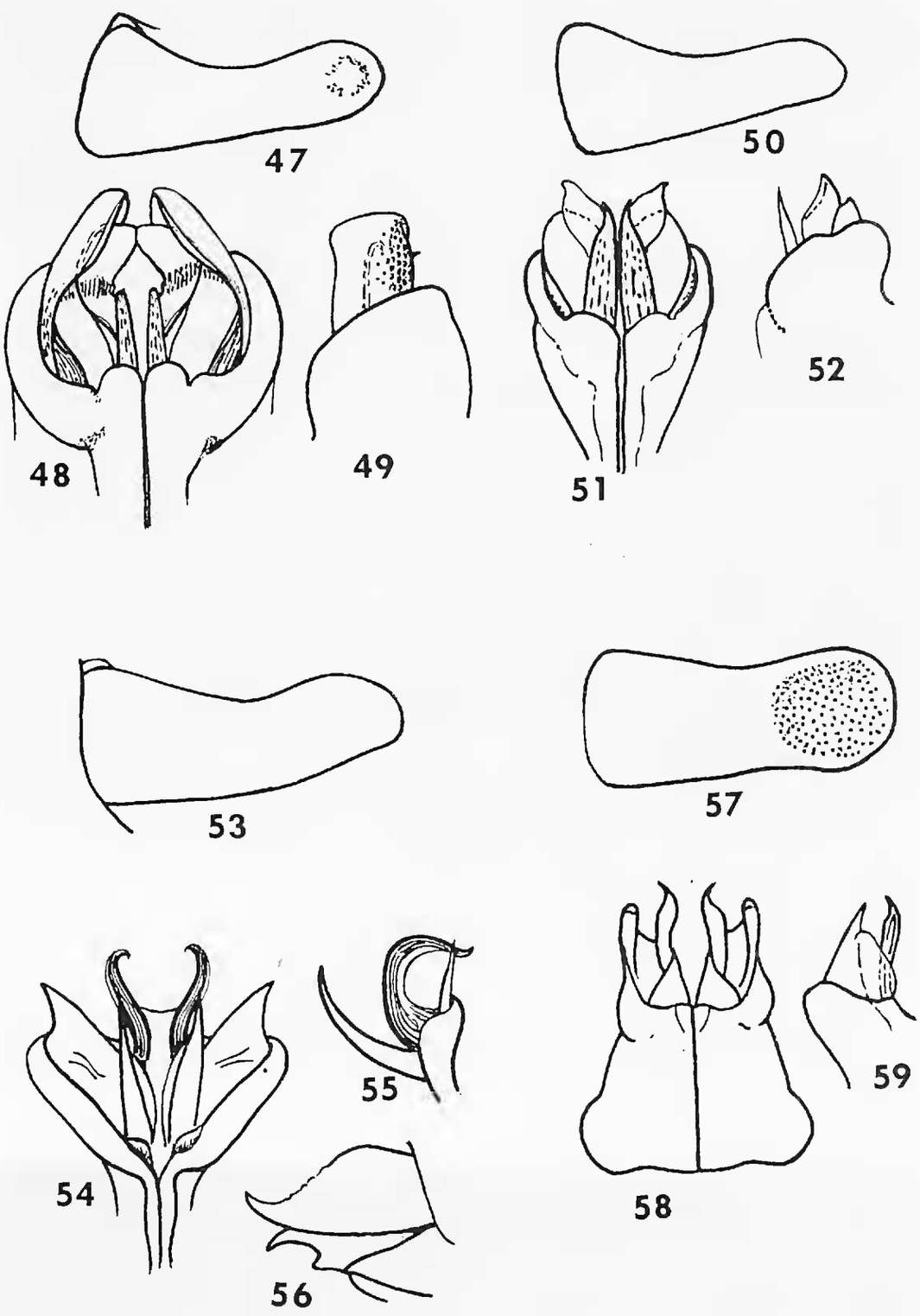
EXPLANATION OF FIGURES

Figs. 47-59. 47, *Melanoplus oreophilus* Hebard, topotype, left cercus of male. 48, the same, aedeagus, ventral (caudal) view. 49, the same, aedeagus, dextral view. 50, *Melanoplus papyraedus* Strohecker, left cercus of male. 51, the same, aedeagus, ventral (caudal) view. 52, the same, aedeagus, dextral view. 53, *Melanoplus daemon*, Strohecker, left cercus of male. 54, the same, aedeagus, ventral (caudal) view, *in situ*. 55, the same, aedeagus, dextral view, *in situ*. 56, the same, ovipositor. 57. *Melanoplus trigeminus* Strohecker, left cercus of male. 58, the same, aedeagus, ventral (caudal) view, *in situ*. 59, the same, aedeagus, dextral view, *in situ*.

Agriculture). Paratypes: 6 males and 8 females with same data as holotype. One male was collected 2 miles southeast of Wildwood on September 18 and a pair was taken 2 miles southwest of Ruth on September 19. Both these localities are in Trinity County.

The aedeagus and lophi of *elater* are similar to those of *bernardinae*.



Melanoplus buxtoni Strohecker, new species

(Figs. 15-18, 21)

Male.—fastigium normally declivent for the group, a little narrower and more deeply sulcate than in *ascensus*. Frontal costa plane, coarsely punctured. Pronotum with lateral carinae feeble but evident, slightly divergent from front basad. Prozone: metazone ratio 4:3. Median carina continuous on prozone but feeble between sulci, strong but low on metazone. Posterior margin subangulate. Tegmina attingent, short-lobate with apex subangulate, extending no farther than hind margin of first abdominal tergite. Abdomen with tergites carinate dorsally, first strongly so, its apex moderately clavate. Furcula very small, its lobes rounded. Epiproct slightly longer than basal width, side margins undulately tumid, distal third with a pair of parallel ridges. Cercus subfalcate, broad at base, tapering rapidly to midlength, thence continuously narrowed to acute, slightly deflexed apex. In dorsal aspect cercus almost straight; its external face linearly sulcate in distal half or third.

Coloration: face and genae green-yellow, occiput dusky with black postocular band continued on the anterior portion of lateral lobe of pronotum.. Dorsum of prozone dusky, entire metazone and lower portion of lateral lobe yellowish. Legs, venter and mesepisternum green-yellow, metepisternum largely yellow. Abdomen yellowish, segments 2-4 with large, lateral black spots, segment 5 with narrow black bar on each side of base. Hind femur with two black nubeculae on upper half of lateral face, these continued across the upper pagina onto upper half of inner face. Lower sulcus and inner face orange-red. Hind tibiae glaucous.

Measurements (mm): length of body 16.5-18; of pronotum 3.8-4.0; of tegmen 3.1-3.8; of hind femur 8.7-9.7.

Female.—no salient differences from other species are shown but the tegmina are shorter and more broadly rounded than in most.

Measurements (mm): length of pronotum 4.3-4.7; of tegmen 3.9-4.8; of hind femur 10.4-10.9.

Holotype male and allotype female: PLASKETT MEADOWS, GLENN COUNTY, CALIFORNIA, on range, September 14, 1960, G. M. Buxton (California Department of Agriculture). Paratypes: 2 males and 1 female taken by D. C. Rentz 6 miles west of Plaskett Meadows on August 27, 1962: two males and one female with same data as holotype.

Of the first two phalli examined one had the cochleate part of the left dorsal aedeagal valve in a median position, the second had this part of the right valve in median position. The phallus, carefully exserted, of a third specimen presented both valvular cochleae ventral to (behind) their sclerites. Figures 16 and 17 were drawn from this preparation *in situ*. In the two phalli first examined the valvular cochleae slipped into a ventral position during potash-alcohol-glycerol treatment.

Melanoplus elaphrus Strohecker, new species

(Figs. 19, 20, 33)

Male.—about the size of and closely resembling *M. saltator* Scudder. Pronotum with lateral carinae blunt but conspicuous, median carina evident throughout but low, especially between sulci, posterior margin obtuse-angulate. Tegmina shorter than pronotum, approximate dorsally, apex feebly produced and more narrowly rounded than in *saltator*. Epiproct as in *saltator* but with oblique, distal carinae weaker. Furcula small, its lobes shorter than tenth segment. Cerci stoutly styliform, tapering through curvature of dorsal margin, a little decurved in apical half, only tip incurved. In some specimens the cercus is more narrowed in its basal third and approximates that of *M. elater* in form. Aedeagus with sclerites of dorsal valves specialized as strongly sclerotized, apically decurved rods with lateral membrane. The ventral valves are typical of the group.

Coloration: not markedly different from that of *saltator*. Hind femur with outer surface dull yellow with small, indefinite, dark blotches; upper pagina blackish; lower pagina, lower sulcus and inferior portion of inner face orange-yellow. Hind tibiae varying from pale green or glaucous to a decided red.

Measurements (mm): length of body 19-23; of pronotum 4.1-4.5; of tegmen 3.5-4.0; of hind femur 10-12.

Female.—very similar to female of *saltator* and I have found no dependable characters for distinguishing the two.

Measurements (mm): length of body 21-24; of pronotum 4.4-5.0; of tegmen 3.9-4.2; of hind femur 10.7-12.

Holotype male and allotype female: 3 MILES EAST OF KNEELAND, HUMBOLDT COUNTY, CALIFORNIA, November 1, 1960, T. R. Haig (California Department of Agriculture). Paratypes: 24 males and 22 females with same data as holotype. An additional 5 males were collected at Ferndale, Humboldt County by Haig on November 2, 1960. Buxton has recently sent 36 males and 25 females collected by him and Blanc from range grasses at Cold Springs, Trinity County on September 18, 1962.

Haig's collection notes state that these insects were found in roughly circular areas fifty to one hundred feet in diameter. When flushed from these spots they quickly returned and collecting was thus easy. These circular areas occurred at intervals of several hundred yards on a rocky surface.

MELANOPLUS LEPIDUS Scudder

Melanoplus lepidus Scudder, Proc. U.S. Nat. Mus., 20:321 (1897)

Hebard (1912:86) designated as lectotype a male from Truckee, Nevada County, California. Gurney (1960:159) has pre-

sented a series of figures. A notable feaure of the aedeagus is the relatively great length of the sclerites of the dorsal valves.

Melanoplus siskiyou Strohecker, new species

(Figs. 14, 36, 37, 40)

Male.—fastigium rather deeply sulcate, much narrowed between eyes. Pronotum with front margin broadly and shallowly excavate at middle, median carina low, obliterated or almost so between sulci, lateral carinae feeble, disc rounding into lateral lobes, hind margin broadly subangulate. Tegmina slightly overlapping, notably attenuate with apex narrowly rounded. Epiproct scarcely longer than basal width, side margins roundly tumid from base to middle, there abruptly convergent and paralleled by oblique ridges, apex acutely rounded. Cercus about two and a half times as long as basal width, a little narrowed in basal third, thence subparallel to apex, upper apical angle broadly rounded, lower angle briefly and roundly produced. Femora much enlarged, hind ones with outer face more than usually convex, lower pagina very strongly developed and decidedly sinuate proximad, base of the femur deflexed into a short "tooth" as in *Aeloplides*. This feature may be seen feebly expressed in other species of the group but is much more strongly developed in *siskiyou*. The aedeagus is very similar to that of *M. elater* but the sclerites of the dorsal valves are more widely separated and more aciculate. The aedeagus also shows some general resemblance to that of *validus*, but the small amount of material at hand does not suggest actual merging of populations.

Coloration: face, genae, lateral lobe of pronotum and mesopleura olivaceous, occiput, prozone of pronotum and first three abdominal tergites fuscous, metazone and tegmina umber. Head with a pair of dark postocular bars, broken dark line on prozonal portion of lateral lobe. Abdomen, metepisternum and femora yellow, hind femur with two irregular dark areas, continued over dorsal paginae onto inner face. Hind femur may be better described as having its outer face largely dark with scattered yellow points on its basal third and a conspicuous yellow band at mid-length, lower pagina and inner face red-orange. Hind tibiae pale blue.

Measurements (mm): length of pronotum 4.6; of tegmen 4.5; of hind femur 10.3.

Female.—fastigium broader and less sulcate than male. Tegmina attingent, narrowly rounded at apex. The single specimen is pale yellow (green in life?) with narrow postocular dark bar and several narrow dark lines on prozonal part of lateral lobe. The transverse sulci dark here but not dorsally. Upper edge of outer face of hind femur with a row of dusky points.

Measurements (mm): length of pronotum 4.9; of tegmen 4.3; of hind femur 11.6.

Holotype male: Ft. Jones, Siskiyou County, California, September 3, 1942, H. W. Graves (California Department of Agriculture). Allotype female: Ft. Jones, August 18, 1948, Earl Gammon (California Department of Agriculture).

Two imperfect males from Ft. Jones are also at hand. At Cold Springs in Trinity County on September 19, 1962 Buxton and Blanc collected a male and seven females which seem referable to this form but have the hind tibiae bright red. The male of this series when compared with the holotype is seen to be smaller and more intensively colored. The prozone of the pronotum is less tumid, with visible lateral carinae, and has a dark bar on the upper part of the lateral lobe. The cercus is more truncate than in the holotype, its upper distal angle more abruptly rounded. Length of pronotum 3.9 mm; of tegmen 4.5 mm; of hind femur 9.5 mm.

MELANOPLUS ASCENSUS Scudder

(Figs. 24, 25, 29, 45)

Melanoplus ascensus Scudder, Proc. Davenport Acad. Sci., 7:196 (1800).

Hebard in 1912 chose a male specimen from Mt. Shasta as lectotype of this species, and in 1937 he discussed *ascensus* at length, placing *M. validus pinicola* Fulton as a synonym. In this latter work he illustrated the left dorsal aedeagal valve.

In *ascensus* and the forms which follow the cochleate portion of the dorsal aedeagal valves is coriaceous, appearing amber-colored even in cleared preparations. These parts are considerably larger in *ascensus* and *calapooyae* than in the other species of the group; the drawings of the aedeagus of these two is 5/6 the scale used in the other drawings of aedeagi. The drawing of the cercus of the McCloud specimen illustrates an extreme apical angulation; indeed the right cercus of this specimen has the lower apical angle more rounded. Possibly the right dorsal aedeagal valve, as illustrated, has suffered some displacment. In a specimen from Upper Klamath Marsh, Oregon the right dorsal valve has an appearance much like that of *calapooyae*.

MELANOPLUS CALAPOOYAE Hebard

Figs. 26, 27, 30, 46)

Melanoplus calapooyae Hebard, Trans. Am. Ent. Soc., 46:385 (1920)

In 1937 Hebard reduced this name to racial status under *ascensus*. I have not seen specimens which are definitely intermediate and have no strong opinions on the relationship of the two.

MELANOPLUS VALIDUS Scudder

(Figs. 22, 23, 31, 44)

Melanoplus validus Scudder, Proc. Davenport Acad. Sci., 7:197 (1899)

Hebard (1912:90) chose Grant's Pass, Oregon as the type

locality and in 1937 placed *validus* as a race of *ascensus*. While the aedeagi are somewhat similar the phallus in its entirety indicates, I think, that if *validus* is of less than specific rank it is a race of *saltator* rather than of *ascensus*. Hebard appended the remark that "its racial validity may yet not be considered unequivocally established."

MELANOPLUS SALTATOR Scudder

(Figs. 38, 39, 41, 42)

Melanoplus saltator Scudder, Proc. U. S. Nat. Museum, 20:261 (1897)

Hebard chose a male from Portland, Oregon as lectotype and in 1938 illustrated the left dorsal aedeagal valve, evidently from a dry preparation. Gurney (1960:159) presented more detailed drawings from potash-glycerol preparations.

THE MONTANUS GROUP

In 1935 Hebard treated this group, in which he included *washingtonius, repetinus, idaho, salmonis* and *oreophilus* in addition to *montanus*. On the basis of aedeagal structure only the first and last of these should be associated, to which is added a third species recently discovered by Dr. Barr.

Melanoplus daemon Strohecker, new species

(Figs. 53-56)

Both male and female closely resemble the corresponding sexes of *M. washingtonius* Bruner. In both sexes the tegmina are slightly overlapping, their exposed portions a little longer than the pronotum with apex narrowly rounded. Face, genae and lower portions of lateral lobe of pronotum ochraceous with two dusky bands crossing outer, upper and inner faces. Hind tibiae and tarsi pink, tibial spines black, calcars yellow with black tips.

Male.—epiproct triangular, broader and longer than in *washingtonius*, its lateral margins reflexted at base and rather deeply sulcate on each side, median costae straight and ending apically in circular plaque bounded on each side by a semicircular ridge. This feature is more strongly developed than in *montanus* (Thomas) and *washingtonius*. Arms of furcula about as long as their segment, symmetrically tapering and bluntly rounded. Cercus similar to that of *washingtonius* but broader and with dorsal margin strongly concave. Dorsal valve with sclerite stout and dark, strongly recurved, the ventral valves long, tapering, aciculate, feebly sclerotized. Figures 54 and 55 were drawn from the phallus *in situ*.

Measurements (mm): length of body 20; of pronotum 4.3; of tegmen 4.6; of hind femur 9.7.

Female.—resembling female of *washingtonius* very closely but with valves of ovipositor more attenuate and acute.

Measurements (mm): length of body 24; of pronotum 5.4; of tegmen 5.6; of hind femur 12.5.

Holotype male and allotype female: 10 MILES WEST OF CUPRUM,

HELL'S CANYON, SHEEP ROCK, ADAMS COUNTY, IDAHO, August 13, 1953, F. V. Nonini (California Academy of Sciences). Three additional females have the same data.

Melanoplus papyraedus Strohecker, new species

(Figs. 50-52)

The following description is based upon a single male which is apparently in a teneral stage of coloration. Male pale tan with a dark bar on lateral lobe of prozone of prontum. Hind tibiae very pale pink. This species is similar to *oreophilus* Hebard but of stouter form. Pronotum with prozone slightly longer than metazone, median carina strongly developed behind principal sulcus but imperceptible on tumid prozone. Hind margin obtusely rounded. Lateral carinae very feeble on metazone and hardly perceptible on prozone. Tegmina broadly overlapping, shorter than pronotum, more broadly rounded at apex than in *oreophilus*. Arms of furcula broad and obtusely rounded at apex, about as long as tenth segment. Cercus twice as long as basal width, tapering rapidly in basal third by concavity of dorsal margin, thence subequal, apex obliquely rounded and externally convex. Subgenital plate short and shallow, broadly tuberculate at apex. Aedeagus without dark sclerotizations, ventral valves erect, acuminate at apex by arcuate excision of lateral margin.

Measurements (mm): length of body 18; of pronotum 4.9; of tegmen 3.8; of hind femur 10.3.

Holotype male: LEMHI PASS, LEMHI COUNTY, IDAHO, July 12, 1956, W. F. Barr (California Academy of Sciences).

The *oreophilus* group would include, besides its nominate species, *repetinus* Hebard, *idaho* Hebard, *salmonis* Hebard and *papyraedus*.

THE ARTEMISIAE GROUP

Hebard (1935) has discussed and figured the salient features of *M. artemisiae* Scudder and *M. lemhiensis* Hebard. To these two must be added another related species found, like the others, in a small area in eastern Idaho.

Melanoplus trigeminus Strohecker, new species

(Figs. 57-59)

Male.—of rather small size for the genus and of grayish general coloration; very similar to *artemisiae* and *lemhiensis*. Eyes prominent, their depth one and a half times length of genal groove. Fastigium much narrowed posteriorly and distinctly sulcate. Pronotum with prozona only a little longer than metazona, median carina feeble, scarcely evident between sulci, hind margin broadly subangulate. Tegmina shorter than pronotum, narrowly rounded at apex. Arms of furcula broad, shorter than tenth segment, rounded at apex. Cercus slightly more than twice as long as its basal width, lower margin almost straight, upper margin little concave, cercus thus narrowest at mid-length, apex evenly and broadly rounded, subtruncate. The cercus is a little incurved at mid-length and strongly flattened in its distal two-fifths.

Subgenital plate with short and broad tubercle at apex. Aedeagus with dorsal valves slender, their apices acute and decurved, ventral valves very broad basally, abruptly tapering distally to the acute apex.

Coloration: face pale, fastigium and occiput mottled with fuscous; postocular bar, continued on sides of prozona, black. Dorsum of pronotum dusky. Lower half of lateral lobes yellow. Meso- and metathorax yellowish, sutures black. Tegmina dusky with most of veins ivory. Abdomen gray, each segment with row of elongate dark markings on posterior margin and narrow, longitudinal dark bar on each side, below which are several brown spots. Sides of the second segment largely black. Hind femur with external face pale brown, inner upper pagina with two dark bars, continued onto inner face. Most of inner face and lower sulcus yellow. Hind tibiae glaucous.

Measurements (mm): length of body 17; of pronotum 3.5; of tegmen 3.2; of hind femur 8.5.

Holotype male: 3 MILES EAST OF BAKER, LEMHI COUNTY, IDAHO, July 12, 1956, W. F. Barr (California Academy of Sciences). Paratypes: a male with same data as holotype and 5 males taken at the type locality by Barr on June 24, 1961.

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